

I claim:

1. A contact heater comprising a plurality of layers:
 - a first layer of a heat conducting adhesive;
 - 5 a first electrical ground sheet extending along the heat conducting adhesive;
 - a first envelope layer;
 - a carrier layer extending along the heat conduction adhesive;
 - a heating element located on said carrier layer;
 - an electrically insulating layer extending along said heating element;
 - 10 a second electrical ground sheet carried by said electrical insulating layer, said second electrical ground sheet having a plurality of openings therein to permit gas passage therethrough;
 - an electrically insulated layer comprising a second envelope layer extending over said second electrical ground sheet;
 - 15 an electrical cord having a first power lead and a second power lead connected to said heating element and a ground wire electrically secured to said ground sheet and said second ground sheet to prevent accidental shock in the event of a heater failure; and
 - said first envelope layer and said second envelope layer an envelope encapsulating said electrical insulating layers, said heating element and at least one of said electrical
 - 20 ground sheets.
2. The contact heater of claim 1 wherein the heating element has a power density is in excess of 15 watts per square inch.
- 25 3. The contact heater of claim 1 wherein the heating element is vulcanized to the carrier layer.

4. The contact heater of claim 1 wherein the carrier layer comprises a layer of silicone rubber.

5. The contact heater of claim 1 wherein the second electrical ground sheet comprises
5 an electrically conducting mesh screen.

6. The contact heater of claim 1 wherein the second electrical ground sheet comprises a sheet of electrically conducting material having a plurality of gas openings therein.

10 7. The contact heater of claim 1 wherein each of the plurality of layers are flexible to thereby form a flexible contact heater for securement to a surface of a fluid reservoir.

8. A temperature elevation system comprising:

a vehicle having a fluid reservoir;

15 an electrical heater secured to the fluid reservoir to conduct heat from the electrical heater to the fluid reservoir;

a ground member located on a free side of the electrical heating element with the ground member located on the free side of the electrical heating element having a plurality of gas passages therein to permit escape of gas therethrough while providing an electrical
20 ground path in the event of failure of the electrical heater.

9. The temperature elevations system of claim 8 wherein the ground members is contained within an envelope containing the electrical heating element.

25 10. The temperature elevation system of claim 8 wherein the ground member comprises a mesh screen.

11. The temperature elevation system of claim 10 including a further electrical ground member with the further electrical ground member and the second electrical ground member located on opposite sides of the heating element.

5 12. The temperature elevation system of claim 11 including a cross over connector electrically connecting the electrical ground member to the further electrical ground member.

10 13. The temperature elevation system of claim 12 wherein the heater includes a first layer of an electrically insulating layer comprising silicone on one side of the heating element and a second layer of an electrical insulation layer comprises a further layer of silicone on the opposite side of the heating element.

15 14. The temperature elevation system of claim 13 wherein the layers of silicone comprise fire extinguishable silicone.

15. The temperature elevation system of claim 14 including a layer of adhesive on said heater for securing said heater to the vehicle reservoir.

20 16. A heater able of withstanding an overheating condition comprising:
a sealed envelope;
a heating element located in said sealed envelope; and
a gas permeable electrical ground member located in the sealed envelope to provide an electrical ground and allow for passage of gas therethrough.

25

17. The heater of claim 16 including a second electrical ground member located on a heat conduction side of the heating element and external to the sealed envelope.

18. The heater of claim 17 wherein the second electrical ground member and the gas permeable electrical ground member form an electrical ground normal to the surfaces of the heating element.

5

19. The heater of claim 18 including a cross over electrical ground member electrically connecting the second electrical ground member and the gas permeable electrical ground member to each other.

10 21. The heater of claim 16 wherein the gas permeable electrical ground member comprises a mesh screen.

22. A method of making a contact heater comprising:

placing an electrically insulating material between a heating element and a gas
15 permeable electrical ground member proximate; and
sealing the heating element, the electrically insulating material and the gas permeable electrical ground member in an envelope to form a sealed enclosure around the heating element and the gas permeable ground member.

20 23. The method of claim 22 including the step of heat sealing layers of an insulating material to each other to form the sealed enclosure.

24. The method of claim 21 including the steps of:

adhering a layer of electrically conducting material to a first side of a sheet of an
25 electrically insulating material;
etching away portions of the electrically conducting material to create a resistance heating element extending along the layer of electrically conducting material;

adhering a first electrical ground member to a second side of said electrical insulation material;

adding a second electrical ground member having a plurality of gas passage therein to a carrier layer;

5 securing the first electrical ground sheet on one side of the heating element and securing a second electrical grounds sheets around an opposite side of the heating element to create an electrical grounding envelope around the heating element; and

 securing a set of electrical power leads to the heating element and a ground wire to each of the electrical ground members to thereby provide an electrical ground path in the
10 event of failure of the contact heater.